DUKANE™
Commercial Sound Technology

Wireless Timekeeping Equipment

Overview

Edwards wireless clock solutions comprise a reliable master/slave cascading network that synchronizes clocks from a central on-site master controller. The master clock receives highly accurate time signals from an NTP or GPS source and relays timecodes to local slave clocks via wireless signals.

Each receiving slave clock acts as a signal repeater, transmitting the timecode instantly to nearby clocks, which do the same. This ripple effect occurs in mere microseconds, but has the ability to synchronize more than 60,000 clocks installed throughout high-rises, sprawling facilities, and small buildings alike.

Because the signal fans out and is repeated by a cascading number of devices, a single clock will typically receive its data from a number of different angles. This dramatically reduces the effect of obstructions, noise sources, or long distances on the reliability of the system. Furthermore, if an individual clock looses its signal, it will link to a nearby clock and automatically synchronize with that new source.

The cascading network also reduces system setup and installation costs, thanks to the relatively low signal strength that is necessary for it to function efficiently. This eliminates the expense and time required to obtain an FCC license.

Standard Features

- ZigBee open protocol cascading wireless network
- Master clock supports GPS or NTP time source
- Can support over 60,000 slave clocks
- Slave clocks act as signal repeaters for enhanced reliability
- Easy to install: low voltage power and signaling; no wiring, no FCC radio license required
- Intuitive browser-based setup
- Digital clocks support count-up/count-down timers and message actuation via wall button (Edwards-ZB266 and Edwards-ZB-456 only) or via remote, or event timing
- Date and time clocks support English, French and Spanish formatting
- Digital clocks are powered via plug-in 110 Vac transformer
- Analog clocks may be powered by plug-in 110 Vac transformer or by batteries.
- Master Clock V2.3 program digital secondary clocks to count-down class change or break times

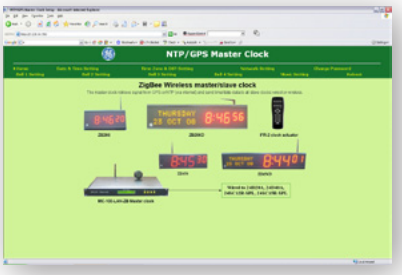
Application

Edwards wireless clocks are ideal wherever synchronized time-keeping is desirable, including schools, hospitals, workplaces, transportation terminals, commercial settings, and industrial facilities. A wide selection of analog and digital slave clocks are available, as is a flexible range of mounting and installation options.

Edwards master clocks easily interface to paging and intercom systems such as Dukane's StarCall for tone generation and audible signaling for bell schedules. They also conform to the open communications standard adopted by the ZigBee alliance of manufacturers, giving them interoperability with a wide range of wireless automation platforms available today and in the future.

Configuration

Edwards wireless clocks are easy to configure thanks to Dukane's exclusive browser-based setup tool. Simply log in to the master clock for intuitive and easy-to-use on-screen configuration.



Engineering Specifications

System

1. ZigBee based wireless analog and/or digital clock system with interface capability to GPS, network, Internet. Because of ZigBee low transmission RF power; this system is better for health compare to other vendor's high power transmitter. No dedicated repeater required, each clock can acts as a receiver and a repeater.
2. The system can work as a stand-alone system or interface to GPS, network, Internet for time synchronization.
3. The system shall be designed to work in an environment where cabling options are not available.
4. The system shall be capable of working in 2.425–2.480 GHz frequency range, which is IEEE 802.15.4 standard. (Default 2.450GHz, ZigBee compliance Platform).
5. Easy to add clocks and easy to move location of existing clocks, no signal wires required.
6. All hardware shall operate in the following environment conditions
   a. Operating temperature: 50 deg F to 120 deg F (10 deg C to 49 deg C)
   b. Humidity: 10% to 95% non-condensing
   c. Shall meet clean room requirements
7. Each clock in the system shall be capable of receiving and transmitting the wireless signal, which allows it to be used as a repeater while boosting the data stream and sending along the system. With this dual capability there shall be no limit on the number of clocks that can be used in the installation. The clock shall be designed to automatically work together without interference with each other. The system shall be capable of increasing the quality of the signal while increasing the quantity of the clocks.
8. The digital clocks shall be capable of working in one (1) of the following options:
   a. 110 volts AC; the clock receives and transmits time every one (1) second.
   b. 24 volts AC/DC; the clock receives and transmits time every one (1) second.
9. The system shall operate in a license-free frequency range where no license is required.
10. System synchronization time from master to slave clock and slave-to-slave clock (one repeater jump) shall not exceed 0.007 seconds (7mS), maximum jump time is 19; maximum delay should be 0.13 seconds (133mS)
11. The master clock shall be capable of programing break time or classroom change times and place all digital secondary clocks in count down mode to show time remaining and then switch back to standard time display.

FCC Approval

1. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Product

1. Transmitter/Transceiver
   a. The Master Clock / Transmitter shall be the Edwards-MC100-NTP/GPS-ZB. The transmitter shall be capable of transmitting data to the GEZB24SC12 series wireless analog clocks and the Edwards-ZB266 and Edwards-ZB456 series wireless digital clocks.
   b. 4 programmable output contacts
   c. The transmitter shall be capable of receiving a time signal from:
      i. From an atomic clock web site via the Internet
      ii. From a GPS source (Support NMEA0183 communication protocol)
   d. From a NTP source (minimum update every 10 seconds)
   e. The master clock shall support a web page interface to manage the output contact schedules. Each output contact shall include the following capabilities
      i. Up to 48 events
      ii. Time-of-day settings down to the minute.
      iii. Day-of-the-week settings:
         1. Individual days of Sun, Mon, Tue, Wed, Thu, Fri or Sat
         2. Mon through Fri
         3. Sat and Sun
         4. Mon, Wed, and Fri
         5. Tue, Thu and Sat
         6. Everyday
      iv. Duration control from 1 to 59 seconds in increments of 1 second.
      v. Separate “On” and “Off” duration control to allow activations of more than 59 seconds using time-of-day and day-of-week settings.
   f. Will have in PC application that allows setting up of the master clock and bell schedules.
   g. Master clock firmware will be updated via software download.
   h. The master clock shall be accurate to 0.2 seconds per day with loss of synchronization with the time standard.
   i. The master clock shall include a standard 10-100 BASE-T half-duplex Ethernet connection
   j. The master clock shall include an internal clock reference so that failure of the primary time receiver shall not cause the clocks to fail in indicating time.
   k. Master Clock should support UTC (Coordinated Universal Time).
   l. The master clock shall be able to support the synchronization of up to 65000 slave clocks.
   m. The transmitter of each wireless clock shall be capable of acting as a repeater while receiving a signal wired or wirelessly from the main transmitter.
   n. Each output contact shall support a common, normally open and normally closed connection (COM, NO, NC), and shall be capable of 5A @ 24 VDC or 120 VAC.
   o. Shall support global daylight saving time changes and different time zones.
   p. The transmitter shall utilize 2.425–2.480 GHz frequency range, which is IEEE 802.15.4 standard. (Default 2.450GHz, ZigBee compliance Platform).
   q. The transmitter shall be FCC and UL compliant
2. Digital Clocks Repeater (secondary Clocks)
   a. The repeaters shall be the Edwards-ZB266 and Edwards-ZB456 series wireless digital clocks. The repeater shall have an RF input sensitivity of –104 dbm. The repeater is to have a RF power output of -7 to max.18 dbm (configurable, default 15dBm).
   b. The clock shall be the Edwards-ZB266 and Edwards-ZB456 series wireless digital clocks and shall have either a full 2.6” or 4.5” high efficiency red LED numeral display.
   c. The clock will operate as a wireless digital slave clock.
   d. The clock shall receive signals from other clocks in the surrounding area or from the transceiver. The clock shall receive and transmit 2.425–2.480 GHz frequency range, which is IEEE 802.15.4 standard. (Default 2.450GHz, ZigBee compliance Platform).
   e. The clocks will be capable of transmitting and receiving the time without interfering with each other.
   f. It shall have a 12 or 24-hour display format.
   g. Date version clocks will display month and day in any combination of English, Spanish, or French languages, which can be programmed on the fly via IR remote.
   h. Shall support count up/down timing via remote
   i. The clock will have a minimum of four (4) levels of adjustable brightness, which can be programmed on the fly via IR remote.
   j. Clocks will feature immediate correction for time changes.
   k. The digital clock shall be capable of being installed either surface or double mount.
   l. Secondary clock will sync with the next strongest signal if it loose contact with its first sync source.
      vi. When the synchronization input is lost, the colon on the display of the clock shall flash.
      vii. The clock shall have an anti–glare bezel with a smooth surface.
      viii. No external screws shall be visible on the bezel or clock housing.
      ix. The clock shall be FCC and UL compliant
3. Analog Clocks:
   a. Shall have the option to be powered by battery or 110 Volt AC
   b. Second hand shall turn off from 12:00 am to 6:00 am to optimize battery life.
   c. Analog clock shall support 12-hour or metric 24-hour time.

Hardware Specifications

Master Clock	
Operating Current	Powered by an AC Adapter from 120VAC to 19V 3A UL/CSA, CE approved. AC cord with U.S. type 3 prong grounded plug, or directly from AC24V
Storage & Operating Environment	50 to 104° F (10 to 40° C); Humidity: 10% to 95% non-condensing
Agency Listings	UL /CSA, FCC
Construction and Finish	Black metal
Master Clock Mounting	Configured as a 19" Rack mount. “Computer Server Black” metal case, 435mm (W), x295mm (D), x45mm (H) .
Transmitting power from master clock	Approximately 0.06W at 2.450~2.480Ghz.
Synchronization time from master to slave clock and slave-to-slave clock (one repeater jump)	Not exceed 0.007 seconds (7mS), maximum jump time is 19; maximum delay 0.13 seconds (133mS).
Time Synchronization	NTP or GPS Master Clocks are synchronized every second and the system has an internal oscillator that maintains plus or minus one second per day between synchronizations so that clock accuracy does not exceed plus or minus 0.2 seconds.
Relay Contacts	4 relay dry contact O/P (NC, C, NO), 5A, Programmable timer for bell operation or lamp on/off control
Scheduling	Support an interface for a software application to manage clock bell schedules and tones or count down time breaks of class changes
Master clock	Support the synchronization of up to 65,000 slave clocks or digital displays.
GPS Antenna	Operating temperature: 50 to 104° F (10 to 40° C); Humidity: 0% to 95% non-condensing, Length of signal cable: 4.5 meters optional 50 meter extension cable, window or roof mounted
Regulatory information	North American standards: FCC Part 15, Subpart A, Subpart C; Canadian ICES-003; CSA C108.8; UL 863 Additional rules and guidelines: ZigBee Alliance (http://www.zigbee.org/en)

Digital Clocks	
Mounting	Wall mount and ceiling mount
Daylight Saving Rules	Factory set. Reconfigurable to any new rule without a hardware update.
Slave clocks	Act as a repeaters. Maximum repeat time is 19; average transmission range should be 100 meters. Line of Sight (LOS) range (nothing blocking) will be 200 meters. It is expected that there will be one slave clock on each floor, within close proximity to each other, when supporting a multi-floor configuration. Synchronization time from master to slave clock and slave-to-slave clock (one repeater jump) shall not exceed 0.007 seconds (7mS), maximum jump time is 19; maximum delay should be 0.13 seconds (133mS). The slave digital clock colon stays lit when the clock is synchronized. If more than seven minutes elapse with no data received from the master clock, the slave clock will run on its time based (crystal) and the colon will flash
Code Blue	Edwards-ZB266 and Edwards-ZB456 support interface to Nurse Call systems that support relay pulse interface to start code blue count up. When invoked, a relay/pulse is sent to the timer, which triggers it to begin counting up. If a code blue status is in effect, it will take priority and the timer’s previous task will run in the background until the code blue function is stopped. A switch control allows the user to operate the timer in multiple modes. (3.0mA max. @ 5vac/dc–120vac/dc)

Analog Clock	
Self running accuracy	Within two seconds per day.
Adjustment	Sensors automatically position hands. No manual adjustment necessary.
ZigBee transmission frequency	2.475GHz
FCC & IC approval wireless module	FCC ID:RF2IPLINK2264, IC ID:8576A-IPLINK2264
Antenna	Internal
Working time on battery power	Five years or more. AC power option also available.
Power conservation	Second hand stops turning from 12:00 am to 6:00 am to conserve battery power.
Physical	13.5"(343 mm) wide x 2.4" (61 mm) deep, 2.6 lb. (1.2 kg).

Ordering Information

Model	Description
Master Clock/Transmitters	
GE-MC100-NTP/GPS-ZB	Master Clock, NTP/GPS time based, with ZigBee transmitter/receiver, UL Listed, AC Adapter. 650 x 400 x 200 mm / 5.0kg

ZigBee Wireless Digital Clocks (Count down/up)

	Size (WxHxD)	Weight	LED Size	LED color	Power in	Current	Included
GE-ZB266	13.8 × 6.7 × 2.6 in. (350 × 170 × 65 mm)	3.5 lb. (1.6 Kg)	Hours: 2.66" Minutes: 2.66" Seconds: 2.0"	Red	110 VAC	0.2 A	Antenna, Code Blue wired input, mounting hardware, 110 VAC power cord.
GE-ZB266D	25.8 × 6.7 × 2.6 in. (655 × 170 × 65 mm)	7lb. (3.2 Kg)	Hours: 2.66" Minutes: 2.66" Seconds: 2.0" Date: 1.2	Hours, minutes, seconds: Red Date: Amber	110 VAC	0.4 A	Antenna, mounting hardware, 110 VAC power cord.
GE-ZB266W (Double-Faced)	13.8 × 6.7 × 5.1 in. (350 × 170 × 130 mm)	10.5 lb. (4.8 Kg) [1]	Hours: 2.66" Minutes: 2.66" Seconds: 2.0"	Hours, minutes, seconds: Red	19 VDC	12 to 30 VDC 21 Watts	Antenna, ceiling mount hardware, 110 VAC power adapter.
GE-ZB266DW (Double-Faced)	13.8 × 6.7 × 5.1 in. (350 × 170 × 130 mm)	17 lb. (7.8 Kg) [1]	Hours: 2.66" Minutes: 2.66" Seconds: 2.0" Date: 1.2	Hours, minutes, seconds: Red Date: Amber	19 VDC	12-30 VDC 33 Watts	Antenna, ceiling mount hardware, 110 VAC power adapter.
GE-ZB456	21.7 × 6.7 × 2.6 in. (550 × 170 × 65 mm)	6.2 lb. (2.8 Kg)	Hours: 4.56" Minutes: 4.56" Seconds: 3.0"	Red	110 VAC	0.2 A	Antenna, Code Blue wired input, wall mount hardware, 110 VAC power cord.
GE-ZB456W (Double-Faced)	21.7 × 6.7 × 5.1 in. (550 × 170 × 130 mm)	15.4 lb. (7 Kg) [1]	Hours: 4.56" Minutes: 4.56" Seconds: 3.0"	Red	19 VDC	12-30 VDC 21 Watts	Antenna, ceiling mount hardware, 110 VAC power adapter.

[1] Stated net wet includes three-step ceiling mounting pole.

Notes:
1. Acceptable low DC voltage operating range
2. Maximum wattage (DC volts × DC amps) over the range of input voltages (worst case)

ZigBee Wireless Analog Clocks

	Model	Format	Diameter	Depth	Weight	Power	Frame
	GE-ZB24SCP12R	12-hour face	12 inches (30.5 cm)	2.4 inches (6.1 cm)	2.2 lb. (1.0 kg)	Battery power or plug-in AC adapter. Can keep batteries in the clock as power loss backup.	Black Plastic with shatter proof face.
	GE-ZB24SCP212R	12/24-hour face					

Accessories

GE-IFR-2	IR Count Down Clock Actuator Infrared transmitter distance: max. 10 meters (face to the clock), Operating battery: 1.5V x 2 size AAA, Operating time: about 2 years (depends on how often it is used). Also used to adjust or set LED brightness and to set language displayed.
GE-MC-020	GPS Receiver with 4.5 m Antenna Cable (Includes Edwards-MC-040)
GE-MC-030	50 Meter Extension cable for GPS antenna
GE-WCD-01	Wireless Digital Clock demo kit
GE-ER34615	Replacement Lithium battery kit

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